Dr Cao. We tended to exclude symptomatic patients above 80 years of age. That is why we had to use age as a continuous variable; otherwise, we couldn't have any results.

Dr Jean Becquemin *(Creteil, France)*. It cannot be denied that the learning curve is very important in this topic of carotid stenting.

Previous discussants of your paper and yourself have quoted the French randomized study EVA-3S, comparing CEA and CAS in symptomatic patients. The final data have not been published yet, so I am not allowed to give the raw figures. But being a member of the organizing committee of the study, I can tell you that most of the complications in the CAS group did not happen in low-volume centers, but they happened in the group of practitioners who had the high-volume cases. So the problem of learning curve is important, but it's not all. Since in the second part of your study you enlarged the indications to asymptomatic patients, the improved results may reflect the fact that you have treated less severe and, thus, less dangerous lesions.

Dr Cao. I have no reply. I agree with you.

INVITED COMMENTARY

Marc Bosiers, MD, *Dendermonde, Belgium*

After reviewing their 627 carotid angioplasty and stenting (CAS) procedures performed over the last 6 years, the vascular team from Perugia, directed by a vascular surgeon, determined that the caseload necessary to be able to perform CAS with similar outcomes as carotid endarterectomy (CEA) was 195 cases. Although this figure seems high, I agree that the minimum number of performed procedures, which ranges from 10 to 30, to be allowed to perform CAS independently that is currently recommended by different societies, hospitals, and study recruiters is far too low. In our center we found that we needed approximately 75 cases to lower our complication rate to an ethically acceptable level. Once this level of expertise was achieved, we observed a similar switch from CEA to CAS, which was mainly driven by the patient demands for a minimally invasive procedure with a similar outcome as surgery.[1]

Interestingly in the Perugia series, just as in other high-volume centers, the same shift of the timing of complications from intraprocedural to postprocedural was observed.[2] During CEA, the emboligenic plaque is removed, but in CAS the plaque material is compressed into the vessel wall and contained by the stent, which remains the only protection against embolization after the procedure. As our group has recently found,[3] a significant correlation exists between more postprocedural events and a larger free cell area of the stent, especially in symptomatic patients.

In this light, one can argue that the recently published data from the randomized Endarterectomy Versus Angioplasty in Patients With Severe Symptomatic Carotid Stenosis (EVA-3S) and Stent Protected Percutaneous Angioplasty of the Carotid vs. Endarterectomy (SPACE) trials that failed to demonstrate equivalency for CAS vs CEA needs an in-depth subanalysis of the learning curve experience of the centers and types of stent (free cell area) that potentially caused more adverse events in the CAS group.

REFERENCES

1. Bosiers M, Peeters P, Deloose K, Verbist J, Sprouse LR. Selection of treatment for patients with carotid artery disease: medication, carotid endarterectomy, or carotid artery stenting. Vascular 2005;13:92-7.
2. Cremonesi A, Setacci C, Manetti R, de Donato G, Setacci F, Balestra G, et al. Carotid angioplasty and stenting: lesion related treatment strategies. Euro Intervent 2005;1:289-95.
3. Hart JP, Peeters P, Verbist J, Deloose K, Bosiers M. Do device characteristics impact outcome in carotid artery stenting? J Vasc Surg 2006;44: 725-30; discussion 730-1.